

AMENDMENTS TO THE CLAIMS:

Claim 1. (Original) An electric power steering apparatus adapted to transmit power supplied from an electric motor for assisting steering, the electric power steering apparatus comprising:

a driving gear and a driven gear through which the power is transmitted,
wherein backlash between the driving gear and the driven gear is set at least in a neighborhood region of a steering neutral position to be smaller than that in a remaining region.

Claim 2. (Original) The electric power steering apparatus according to claim 1, wherein the driven gear includes a bias portion formed by biasing a part of an outer periphery of teeth in a direction in which the backlash is decreased.

Claim 3. (Currently amended) The electric power steering apparatus according to claim 1, wherein the driving gear comprises ~~is constituted by a worm~~ worm, the driven gear comprises ~~is constituted by a worm~~ worm wheel, and a shaft center of the worm worm is offset in an axial direction of the worm worm wheel by a predetermined offset amount.

Claim 4. (New) The apparatus of claim 1, wherein said neighborhood region comprises a steering angular range on each side of said steering neutral position.

Claim 5. (New) The apparatus of claim 4, wherein said steering angular range comprises a substantially equal steering angle on each side of said neutral position.

Claim 6. (New) The apparatus of claim 5, wherein said steering angle comprises about twenty degrees of steering angle.

Claim 7. (New) The apparatus of claim 4, wherein said remaining region comprises a steering angle that exceeds said steering angular range.

Claim 8. (New) The apparatus of claim 1, wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 9. (New) The apparatus of claim 8, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 10. (New) The apparatus of claim 1, wherein said backlash changes gradually between said neighborhood region of operation and said remaining region of operation.

Claim 11. (New) The apparatus of claim 1, wherein at least one of said driving gear and

said driven gear comprises a bias portion that corresponds to said neighborhood range of operation.

Claim 12. (New) The apparatus of claim 11, wherein said bias portion is provided on an outer peripheral portion of the teeth on said at least one of said driving gear and said driven gear.

Claim 13. (New) The apparatus of claim 1, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said neighborhood region that is larger than a second radius of a pitch circle corresponding to said remaining region.

Claim 14. (New) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 15. (New) The apparatus of claim 13, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 16. (New) A power steering apparatus comprising:

a driving gear; and

a driven gear engaging the driving gear such that a backlash between the driving gear and the driven gear is smaller in a first range of operation than a second range of operation.

Claim 17. (New) The apparatus of claim 16, wherein the first range of operation corresponds to a neutral position for a steering wheel of a vehicle comprising the electric power steering apparatus.

Claim 18 (New) The apparatus of claim 17, wherein the neutral position corresponds to a straight traveling condition for said vehicle.

Claim 19. (New) The apparatus of claim 16, wherein at least one of said driving gear and said driven gear comprises a bias portion that corresponds to said first range of operation.

Claim 20. (New) The apparatus of claim 19, wherein said bias portion is provided on an outer peripheral portion of the teeth on said at least one of said driving gear and said driven gear.

Claim 21. (New) The apparatus of claim 16, wherein one of said driving gear and said driven gear comprises a worm gear and the other of said driving gear and said driven gear comprises a worm wheel engaging said worm gear.

Claim 22. (New) The apparatus of claim 21, wherein a shaft center of said worm is offset in an axial direction relative to said worm wheel by a predetermined offset amount.

Claim 23. (New) The apparatus of claim 16, wherein at least one of said driving gear and said driven gear comprises a first radius of a pitch circle corresponding to said first range of

operation that is larger than a second radius of a pitch circle corresponding to said second range of operation.

Claim 24. (New) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is smaller than said first radius.

Claim 25. (New) The apparatus of claim 23, wherein the at least one of said driving gear and said driven gear comprises a gearing radius that is larger than said second radius.

Claim 26. (New) The apparatus of claim 16, wherein the first range of operation corresponds to a steering angular range about a neutral steering position.

Claim 27. (New) The apparatus of claim 26, wherein said steering angular range comprises a substantially equal steering angle on each side of said neutral steering position.

Claim 28. (New) The apparatus of claim 26, wherein said steering angular range comprises about twenty degrees of steering angle.

Claim 29. (New) The apparatus of claim 16, wherein:

ΔRA corresponds to an amount of change in a gearing angle RA per arc-minute of backlash between said driving gear and said driven gear;

α corresponds to a pressure angle between said driven gear and said driving gear;

D corresponds to a pitch circle diameter of one of said driving gear and said driven

gear; and

$$\Delta RA = (\pi \times D) / (360 \times 60 \times 2 \times \tan(\alpha)).$$

Claim 30. (New) The apparatus of claim 29, wherein when the pitch circle diameter ranges from about 80 millimeters to about 100 millimeters and wherein the amount of change in gearing angle RA per arc-minute of backlash ΔRA comprises a range of about 22 micrometers to about 28 micrometers.

Claim 31. (New) The apparatus of claim 16, wherein said backlash changes gradually between said first region of operation and said second region of operation.

Claim 32. (New) The apparatus of claim 16, further comprising a motor for providing a steering assistance torque to said driving gear and wherein said first region of operation corresponds to a region of operation where said drive motor provides a smaller steering assistance torque than said second region of operation.